b=the earnings retention rate;
r=return on common equity investment (referred to below as "book equity");
v=the fraction of funds raised by the sale of stock that increases the book value of the existing shareholders' common equity; and
s=the rate of continuous new stock financing.
The constant growth model is therefore correctly recognized to be:
$k=D/P + (br + sv)$

The cost of equity demanded by investors is the sum of two factors. The first factor is the dividend yield. The second factor is growth (dividends and stock price). The logical relationship among these factors is as follows: the dividend yield is calculated based on current dividend payments while growth indicates what dividends and stock price will be in the future.

Q. WHAT OTHER FACTORS IMPACT HOW ONE USES THE CONSTANT GROWTH FORM OF THE DCF MODEL?

A. Sufficient care must be taken to be sure that the growth rate "g" is representative of the constant sustainable growth. To obtain an accurate constant growth DCF result, the mathematical relationship between earnings, dividends, book value and stock price must be respected.

Suppose one is faced with a situation where Value Line forecasts of growth are being used as a source for inputs and Value Line projects different growth rates for earnings per share and dividends per share. Under such conditions, the earnings per share growth rate does not provide a reasonable proxy for earnings per share growth, and dividends per share and stock price growth as well. Consider the following:

1. It is the lower dividend growth rate that makes it possible for more earnings to be retained, which in turn makes the earnings per share growth rate higher than it would be if dividends had in fact been modeled by Value Line to keep pace with earnings per share growth.

2. A dividend growth rate that is lower than both the earnings per share growth rate and the stock price growth rate means that the dividend yield will be going down. However, the constant growth form of the DCF model has no mechanism to account for the lower dividend yield investors would get if the Value Line projections were correct.

Using an earnings per share growth rate in the constant growth form of the DCF model will therefore result in an overstatement of the cost of equity whenever the earnings per share growth rate that has been modeled is derived along with an expectation of a lower dividend growth rate. This is because, under these conditions, the dividend yield portion of the constant growth form of the equation will be overstated.

The basic difference between the use of an analysts' earnings per share growth rate in the constant growth DCF formula and using the "br" (**b** (the earnings retention rate) X **r** (rate of return on common equity investment)) approach is that the "br" form, if properly applied, eliminates the mathematical error caused by an inconsistency between the expectations for earnings per share growth and dividends per share growth. Because it eliminates that error, the results of a properly applied "br" approach will be superior to the answer obtained from other approaches to the constant growth form of the DCF model. This is not to say that even a properly applied "br" approach will be perfect. The self-correcting nature of a properly applied "br" to forecasted differences in earnings per share

and dividends per share growth rates helps mitigate the resultant error, but should not be viewed as the perfect way to quantify the impact of expected non-constant growth rates.

Q. ARE YOU AWARE OF CLAIMS ALLEGING THAT THE "BR" APPROACH TO THE CONSTANT GROWTH DCF MODEL IS FLAWED BECAUSE IT RELIES ON THE VALUE OF THE FUTURE EXPECTED RETURN ON BOOK EQUITY "R" TO ESTIMATE WHAT THE EARNED RETURN ON EQUITY SHOULD BE?

A. Yes. One common criticism is that it is not reasonable for the DCF to indicate a cost of equity (market return) that is different (lower or higher) than the expected return on book equity (accounting). There are multiple reasons why this concern is unfounded:

1. The constant growth form of the equation using "br" is:

$$k = D/P + (br + sv).$$

In this equation, k is the variable for the cost of equity, and r is the future expected return on equity. The cost of equity, "k," is not the same variable as the future expected earned return on equity, "r." In fact, there often is a large difference between the two.

2. The correct value to use for "r" is the return on book equity expected by investors as of the time the stock price and dividend data is used to quantify the D/P term in the equation. Therefore, even if future events occur that may change what investors expect for "r", the computation of the cost of equity "k" remains correct as of the time the computation was made.

3. The ability of a commission's ROE decision to influence future cash flow expectations is not unique to the retention growth DCF approach. The five-year

analysts' earnings per share growth rate is a computation that is directly influenced by what earnings per share will be in five years. Allowed ROE's impact earning – higher allowed returns lead to higher earnings growth because the higher allowed returns the more earnings that is available for reinvestment.

Q. CAN CHANGES IN THE ACTUAL EARNED RETURNS IMPACT GROWTH ABOVE AND BEYOND WHATEVER GROWTH RESULTS FROM EARNINGS RETENTION?

A. Yes, but large short-term changes in earnings per share caused by a perceived change in the future expected earned returns are unsustainable. The new perceived earned return on book equity should be part of the computation, but the one-time growth spurt to get there is no more indicative of the sustainable growth required in the constant growth DCF formula than the temporary negative growth that occurs when a company has a bad year.

Q. HOW HAVE YOU IMPLEMENTED THE CONSTANT GROWTH FORM OF THE DCF MODEL IN THIS CASE?

A. I have applied the constant growth form of the DCF model by staying true to the mathematically derived "k=D/P + (br + sv)" form of the DCF model. I have also taken care to fully allocate all future expected earnings to either future cash flow in the form of dividends ("D") or to retained earnings (the retention rate, "b"). This extra accuracy is obtained only when the retention rate "b" is derived from the values used for "D" and "r," rather than independently.

Q. PLEASE EXPLAIN HOW YOU OBTAINED THE VALUES TO INPUT INTO THE CONSTANT GROWTH FORM OF THE DCF METHOD.

A. The DCF model generally calls for the use of the dividend expected over the next year. A reasonable way to estimate next year's dividend rate is to increase the quarterly dividend rate by ½ of the current actual quarterly dividend rate. This is a good approximation of the rate that would be obtained if the full prior year's dividend were escalated by the entire growth rate.[32]

I obtained the stock price—"P"—used in my DCF analysis from the closing prices of the stocks on December 31, 2019. I also obtained an average stock price for the 12 months ending December 31, 2019 by averaging the high and low stock prices for the year.

I based the value of the future expected return on equity— "r" —on the average return on book equity expected by Value Line, adjusted in consideration of recent returns. I also made a computation that was based on a review of both the earned return on equity consistent with analysts' consensus earnings growth rate expectations and on the actual earned returns on equity. For a stable industry such as utility companies, investors will typically look at actual earned returns on equity as one meaningful input into what can be expected for future earned returns on book equity. See Exhibit ALR 4, page 1.

This return on book equity expectation used in the DCF method to compute growth must *not* be confused with the cost of equity. Since the stock prices for the comparative

[32] For example, assume a company paid a dividend of $0.50 in the first quarter a year ago, and has a dividend growth rate of 4 % per year. This dividend growth rate equals (1.04)^4-1=0.00985 % per quarter. Thus, the dividend is $0.5049 in the second quarter, $0.5099 in the third quarter, and $0.5149 in the fourth quarter. If that 4 % per annum growth continues into the following year, then the dividend would be $0.5199 in the 1st quarter, $0.5251 in the 2nd quarter, $0.5303 in the 3rd quarter, and $0.5355 in the 4th quarter. Thus, the total dividends for the following year equal $2.111 (0.5199 + 0.5251 + 0.5303 + 0.5355). I computed the dividend yield by taking the current quarter (the $0.5149 in the 4th quarter in this example), and multiplying it by 4 to get an annual rate of $2.06. I then escalated this $2.06 by ½ the 4 % growth rate, which means it is increased by 2 %. $2.06 x 1.02= $2.101, which is within one cent of the $2.111 obtained in the example.

companies are considerably higher than their book value, the return investors expect to receive on their market price investment is considerably less than whatever is the anticipated return on book value. If the market price is low relative to book value, the cost of equity will be higher than the future expected return on book equity, and if the market price is high, then the return on book equity will be less than the cost of equity.

In addition to growing through the retention of earnings, utility companies also grow by selling new common stock. Selling new common stock increases a company's growth. I quantified this growth caused by the sale of new common stock by multiplying the amount that the actual market-to-book ratio exceeds 1.0, by the compound annual growth rate of stock that Value Line forecasts. The results of that computation are shown on line 4 of Exhibits ALR 4, page 1.

Pure financial theory prefers concentrating on the results from the most current price because investors cannot purchase stock at historical prices. There is a legitimate concern, however, about the potential distortion of using just a single price. I present both so this Commission can use the approach it deems more appropriate. As shown in Exhibit ALR 2, my DCF method, applied to the Water Proxy Group, the DCF result based on the year-end stock price and the DCF result based on average prices for the year ending December 31, 2019 is 8.76%. As of December 31, 2019, the result is 8.34%. Exhibit ALR 4, page 1, shows more of the specifics of how I implemented the constant growth form of the DCF model for the Water Proxy Group.

Q. PLEASE EXPLAIN HOW YOU DETERMINED WHAT VALUE TO USE FOR "R" WHEN COMPUTING GROWTH IN YOUR CONSTANT GROWTH FORM OF THE DCF MODEL.

A. The inputs I considered are shown in Footnote [C] of Exhibit ALR 4, page 1A and B. The value of "r" that is appropriate to use in the DCF formula is the value anticipated by investors to be maintained on average in the future. This schedule shows that the average future return on equity forecast by Value Line for the Water Proxy Group for 2019-2022-2024 is 13.00%. The same footnote also shows that the future expected return on equity derived from the Zacks consensus forecast is 10.93%, and that the actual returns on equity earned on average by the Water Proxy Group were 10.57% in 2016, 10.59% in 2017 and 10.50% in 2018. Based on the combination of the forecast return on equity derived from the Zacks consensus, the recent historical actual earned returns and Value Line's forecast, I made the DCF growth computation using a 11.85%[33] value of "r" for the year-end stock price data, I used an "r" of 11.20%.

Q. WHAT COST OF EQUITY IS INDICATED BY THE CONSTANT GROWTH FORM OF THE DCF METHOD THAT YOU RELY ON FOR YOUR RECOMMENDATION?

A. The result of my DCF analysis using the Constant Growth form of the DCF indicates a cost of equity range of between 8.34% and 8.76% for the Water Proxy Group.[34] Since these DCF findings use analysts' forecasts to derive sustainable growth (in part) and on analysts' forecasts of dividend growth and book value growth in the non-constant form of the DCF method, the results should be considered as conservatively high. This is because, as

[33] I used 11.85% and 11.20% in consideration of historical returns, allowed returns and Value Line projected returns for the Water Proxy Group.
[34] Exhibit ALR -2.

previously mentioned above, analysts' forecasts of such growth have been notoriously overstated.

My results are not as influenced by over-optimistic analysts' forecasts as would have been the case had I merely used analysts' five-year earnings growth rate forecasts as a proxy for long-term growth. This is because the DCF methods I use compute sustainable growth rates rather than growth rates that can exaggerate the growth rate due to assuming that a relatively short-term forecast (five-years) will remain indefinitely.

D. Non-Constant Growth Form of the DCF Model

Q. PLEASE EXPLAIN HOW YOU IMPLEMENTED THE NON-CONSTANT GROWTH FORM OF THE DCF MODEL.

A. The non-constant growth form of the DCF model determines the return on investment expected by investors based on an estimate of each separate annual cash flow the investor expects to receive. For the purpose of this computation, I've incorporated Value Line's detailed annual forecasts to arrive at the specific non-constant growth expectations that an investor who trusts Value Line would expect. This implementation is shown on Exhibit ALR 4, page 2-3. In the first stage cash flow entry is the cash outflow an investor would experience when buying a share of stock at the market price. The subsequent years of cash flow are equal to the dividends per share that Value Line forecasts. For the intermediate years of the forecast period in which Value Line does not provide a specific dividend, the annual dividends were obtained by estimating that dividend growth would persist at a compound annual rate. The cash flow at the end of the forecast period consists of both the last year's dividend forecast by Value Line and the proceeds from the sale of the stock. The stock price used to determine the proceeds from selling the stock was obtained by

estimating that the stock price would grow at the same rate at which Value Line forecasts book value to grow.

Q. WHY DID YOU USE BOOK VALUE GROWTH TO PROVIDE THE ESTIMATE OF THE FUTURE STOCK PRICE?

A. For any given earned return on book equity, earnings are directly proportional to the book value. Furthermore, book value growth is the net result after the company produces earnings, pays a dividend and also, perhaps, either sells new common stock at market price or repurchases its own common stock at market price.

Once these cash flows are entered into an Excel spreadsheet, the compound annual return an investor would achieve as a result of making this investment was obtained by using the Internal Rate of Return (IRR) function built into the spreadsheet. As shown on Exhibit ALR 4, pages 2-3, this multi-stage DCF model produced an average indicated cost of equity of 5.72% based on the year-end stock price and 6.96% based on average prices for the year ending December 31, 2019 for the Water Proxy Group.

Q. YOUR NON-CONSTANT GROWTH DCF MODEL USES ANNUAL EXPECTED CASH FLOWS. SINCE DIVIDENDS ARE PAID QUARTERLY RATHER THAN ANNUALLY, HOW DOES THIS SIMPLIFICATION IMPACT YOUR RESULTS?

A. I used the annual model because it is easier to input the data and for observers to visualize what is happening. By modeling cash flows to be annual rather than when they actually are expected to occur causes a small overstatement of the cost of equity.

Q. WHY IS IT A SMALL OVERSTATEMENT IF YOU HAVE MODELED DIVIDENDS TO BE RECEIVED SOME MONTHS AFTER INVESTORS ACTUALLY EXPECT TO RECEIVE THEM?

A. The process of changing from an annual model to a quarterly model would require two changes, not just one. A quarterly model would show dividends being paid sooner and would also show earnings being available sooner. A company that receives its earnings sooner, rather than at the end of the year, has the opportunity to compound them. Since revenues, and therefore earnings, are essentially received every day, a company that is supposed to earn an annual rate of 9.00% on equity would have to earn only 8.62% if the return were compounded daily.[35] This reduction from 9.00% to 8.62% would then be partially offset by the impact of the quarterly dividend payment to bring the result of switching from the simplifying annual model closer to, but still a bit below 9.00%.

Q. BY USING CASH FLOW EXPECTATIONS AS THE VALUATION PARAMETER, DOES THE NON-CONSTANT DCF MODEL STILL RELY ON EARNINGS?

A. Yes. It relies on an expectation of future cash flows. Future cash flows come from dividends during the time the stock is owned and capital gains from the sale of the stock once it is sold. Since earnings impact both dividends and stock price, the non-constant DCF model still relies on earnings.

Every dollar of earnings is used for the benefit of stockholders, either in the form of a dividend payment or earnings reinvested for future growth in earnings and/or dividends. Earnings paid out as a dividend have a different value to investors than earnings retained in the business. Recognizing this difference and properly considering it in the quantification process is a major strength of the DCF model, and is why the non-constant

[35] (1+.0862/365)^365=1.09=9.00 %.

DCF model as I have set forth is an improvement over either the P/E ratio or D/P methods.

Q. WHY IS THERE A DIFFERENCE TO INVESTORS IN THE VALUE OF EARNINGS PAID OUT AS A DIVIDEND COMPARED TO THE VALUE OF EARNINGS RETAINED IN THE BUSINESS?

A. The return on earnings retained in the business depends upon the opportunities available to that company. If a regulated utility reinvests earnings in needed used and useful utility assets, then those reinvested earnings have the potential to earn at whatever return is consistent with ratemaking procedures allowed and the skill of management in prudently operating the system.

When an investor receives a dividend, he can either reinvest it in the same or another company or use it for other things, such as paying down debt or paying living expenses. Although an investor could theoretically use the proceeds from any dividend payments to simply buy more stock in the same company, when an investor increases his investment in a company by purchasing more stock, the transaction occurs at market price. However, when the same investor sees his investment in a company increase because earnings are retained rather than paid as a dividend, the reinvestment occurs at book value. Stated within the context of the DCF terminology: earnings retained in the business earn at the future expected return on book equity "r," and dividends used to purchase new stock earn at the rate "k." When the market price exceeds book value (that is, the market-to-book ratio exceeds 1.0), retained earnings are worth more than earnings paid out as a dividend because "r" will be higher than "k." Conversely, when the market price is below

book value, "k" will be higher than "r," meaning that earnings paid out as a dividend earn a higher rate than retained earnings.

Q. IF RETAINED EARNINGS WERE MORE VALUABLE WHEN THE MARKET-TO-BOOK RATIO IS ABOVE 1.0, WHY WOULD A COMPANY WITH A MARKET-TO-BOOK RATIO ABOVE 1.0 PAY A DIVIDEND RATHER THAN RETAIN ALL OF THE EARNINGS?

A. Retained earnings are more valuable than dividends only if there are sufficient opportunities to profitably reinvest those earnings. Regulated utility companies are allowed to earn the cost of capital only on assets that are used and useful in providing utility service. Investing in assets that are not needed may not produce any return at all. For unregulated companies, opportunities to reinvest funds are limited by the demands of the business. For example, how many new computer chips can Intel profitably develop at the same time?

Q. UNDER THE NON-CONSTANT DCF MODEL, IS IT NECESSARY FOR EARNINGS AND DIVIDENDS TO GROW AT A CONSTANT RATE FOR THE MODEL TO BE ABLE TO ACCURATELY DETERMINE THE COST OF EQUITY?

A. No. Because the non-constant form of the DCF model separately discounts each and every future expected cash flow, it does *not* rely on any assumptions of constant growth. The dividend yield can be different from period to period, and growth can bounce around in any imaginable pattern without harming the accuracy of the answer obtained from quantifying those expectations. When the non-constant DCF model is correctly used, the answer obtained is as accurate as the estimates of future cash flow.

Q. WHAT COST OF EQUITY DOES YOUR NON-CONSTANT GROWTH DCF METHOD INDICATE?

A. My non-constant growth DCF method indicates a cost of equity of between 7.57% and 9.41%.[36]

E. Capital Asset Pricing Model

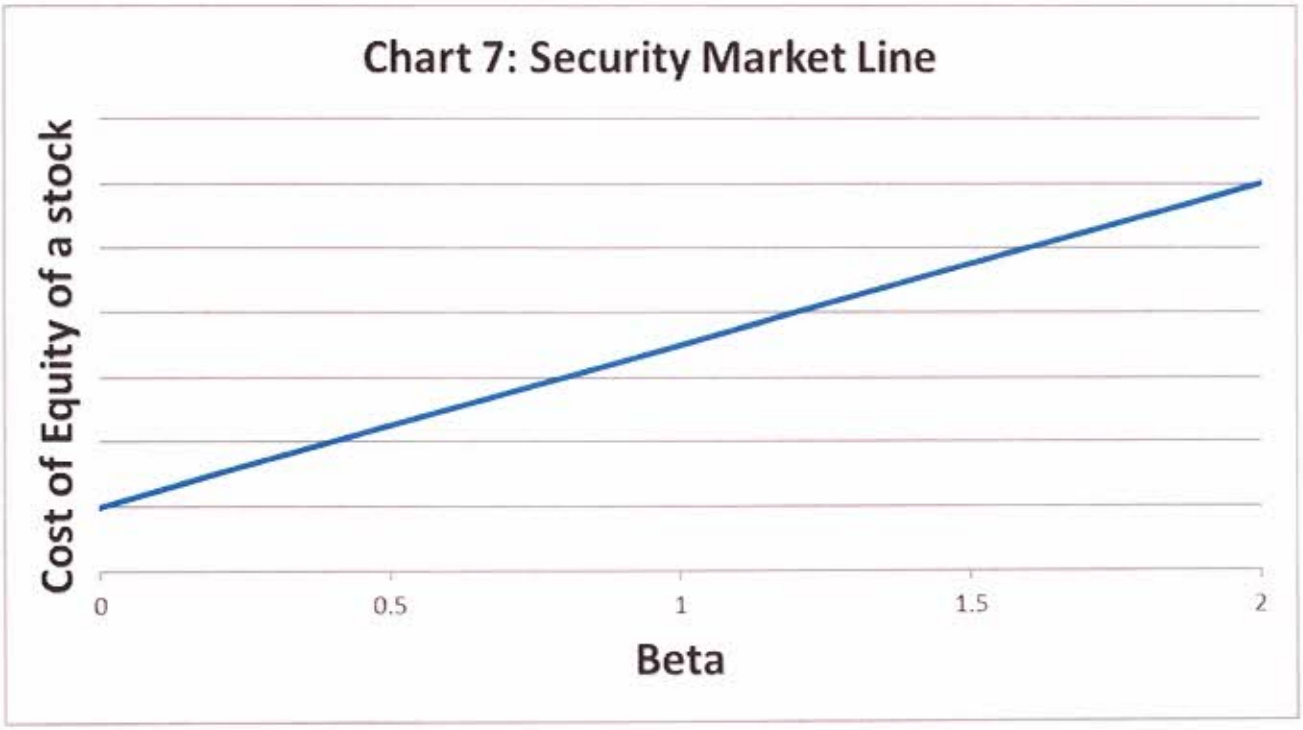
Q. PLEASE DESCRIBE THE CAPM.

A. CAPM stands for "Capital Asset Pricing Model." The CAPM relates return to risk; specifically, it relates the expected return on an investment in a security to the risk of investing in that security. The riskier the investment, the greater the expected return (*i.e.*, the cost of equity) investors require to make for that investment.

Investors in a firm's equity face two types of risks: (1) firm-specific risk and (2) market risk (financial analysts refer to this market risk as systematic risk). Firm-specific risk refers to risks unique to the firm such as management performance and losing market share to a new competitor. Investors can reduce firm-specific risk by purchasing stocks as part of a diverse portfolio of companies, if they construct the portfolio to cause the firm-specific risk of individual companies to balance out. Market-related risk refers to potential impacts from the overall market such as a recession or interest rate changes. This risk cannot be removed by diversification, so the investor must bear it no matter what. Because the investor has no option but to bear market risk, the investor's cost of equity will reflect that risk. The CAPM predicts that for a given equity security, the cost of equity has a positive linear relationship to how sensitive the stock's returns are to

[36] Exhibit ALR- 4, pages 2-3.

movements in the overall market (e.g., S&P 500). A security's market sensitivity is measured by its **Beta.**[37] As shown in Chart 7 below, the higher the beta of a stock, the higher the company's cost of equity—the return required by the investor to invest in the stock.



Here is the standard CAPM formula:

$$K = Rf + \beta i * (Rm - Rf)$$

Where:
K is the cost of equity;
Rf is the risk-free interest rate;
Rm is the expected return on the overall market (e.g., S&P 500);
[Rm – Rf] is the premium investors expect to earn above the risk-free rate for investing in the overall market ("equity risk premium" or "market risk premium"); and
βi (Beta) is a measure of non-diversifiable, or systematic, risk.

[37] The covariation of the return on an individual security with the return on the market portfolio.

Q. PLEASE EXPLAIN HOW YOU IMPLEMENTED THE CAPM.

A. First, I determined appropriate values or ranges for each of the three model inputs: (a) Risk Free Rate, (b) Beta, and (c) Equity Risk Premium. Second, I used the equation above to calculate the cost of equity implied by the model. Below I will explain how I calculated the three model inputs and summarize the CAPM cost of equity numbers resulting from those inputs. Table 6 below shows my CAPM results.

1a. Risk Free Rate

I chose to use a risk-free rate of 1.55 %[38] based on short-term U.S. Treasury bills (3-months) and long-term U.S. Treasury bonds of 2.39% (30-years) as of December 31, 2019. U.S. government bonds are reasonable to use as a risk free rate because they have a negligible risk of default. The value of Short-term U.S. Treasury bills has a relevantly low exposure to swings in the overall market. The value of long-term U.S. Treasury bonds are relatively more exposed to the market and therefore must be used with caution. I considered using a risk-free rate based on subtracting the historical spread between long-term and short-term U.S. Treasury bills from current long-term yields, as recommended by some financial textbooks.[39] I did not use this method because, in the current capital markets, this method results in an unreasonably low risk-free rate (under 1%).

[38] Exhibit ALR 5, page 4.
[39] Brealey, Myers, and Allen (2017), Principles of Corporate Finance, 12th Edition, McGraw-Hill Irwin, New York, page 228

1b. Beta

Since the cost of equity should be based on investor expectations, I chose to use two betas that are based on forward-looking investor expectations of non-diversifiable risk.

Most published betas are based on historical return data. For example, Value Line publishes a 5-year historical beta for each of the companies it covers. However, it is also possible to calculate betas based on investors' expectations of the probability distribution of future returns. This probability distribution of future returns expected by investors can be calculated based on the market prices of stock options.

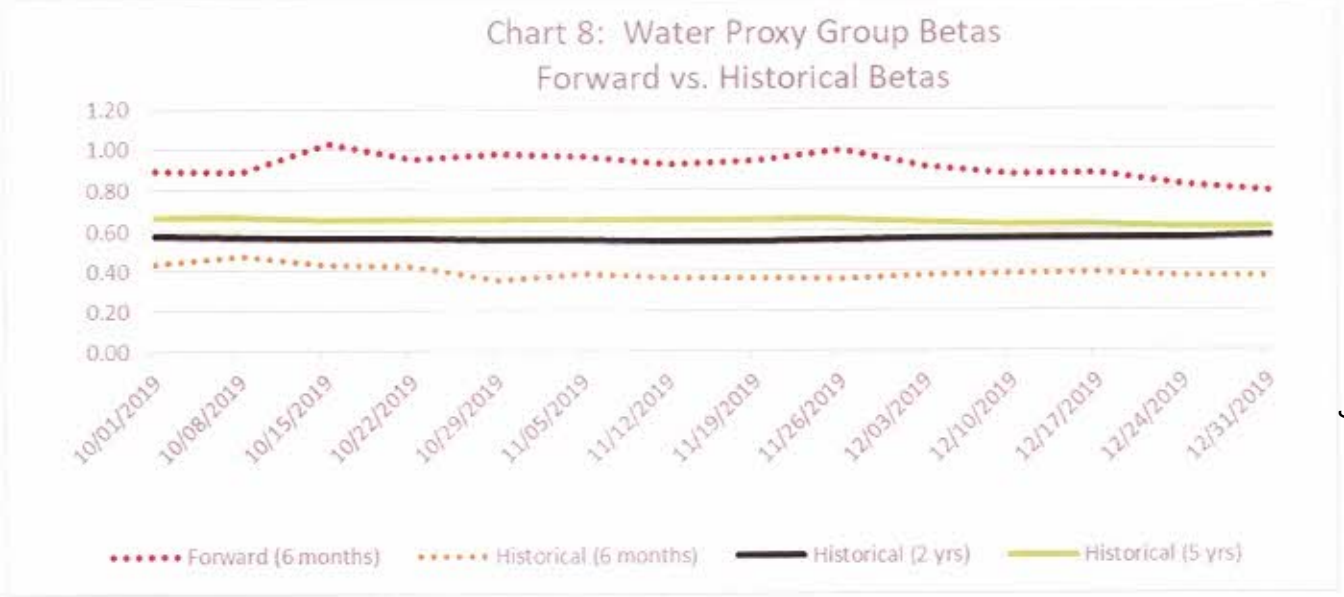
A stock option is the right to buy or sell a stock at a specific price for a specified amount of time. A call option is the right to buy a stock at a specified exercise or strike price on or before a maturity date. A put option is the right to sell a stock at a specified exercise or strike price on or before a maturity date. For example, a call option to purchase Apple Computer stock for $230 on January 17, 2020 allows the owner the option (not the obligation) to buy Apple stock for $230 on that date. At the end of July 2019, Apple stock was trading at about $215 per share. Why would anyone pay for the right to buy a stock higher than the current price? Investors purchasing call options think there is a chance Apple stock will be trading higher than $230 on January 17, 2020 and the option will give the investor the right to buy Apple stock for $230 and profit by selling it at the market price on that date if it is higher.

The market prices of put options and call options provide information regarding the probability distribution of future stock prices expected by investors. Using established techniques, I am able to use price data for stock options of my Proxy Group

companies and the S&P 500 Index to determine investors' return expectations, including the relationship (covariance) between the return expectations for individual Proxy Group companies and those for the overall market (S&P 500). This covariance between the expected returns for my Proxy Group and for the S&P 500 indicates what investors expect betas will be in the future. I refer to betas based on option price calculations as "option-implied betas."

Traditionally, the betas used in CAPM calculations are calculated from historical returns. This approach has strengths and weaknesses. An alternative way to calculate betas is to incorporate investors' return expectations by calculating option-implied betas as explained in the previous paragraph. As discussed below, I have chosen to use both historical and option-implied betas in my CAPM analysis. I chose to use option-implied betas in my CAPM analysis because, among other reasons, studies have found that betas calculated based on investor expectations (option-implied) provide information regarding future perceived risks and expectations.[40] As shown in Chart 8 below, stock option prices indicate that investors likely expect higher betas for the Proxy Group in the future.

[40] Bo-Young Chang & Peter Christoffersen & Kris Jacobs & Gregory Vainberg. (2011) Option-Implied Measures of Equity Risk, *Review of Finance* 16: 385-428.



See Exhibit ALR 5, page 2 for data used in creating the chart above.

I used the following two betas in my CAPM analysis:

1. **Hybrid Beta:** 50% Option-Implied Beta (6 months) + 25% Historical Beta (6 months) + 15% Historical Beta (2 years) + 10% Historical Beta (5 years).
2. **Forward Beta:** 100% Option-Implied Beta (6 months).

Historical Beta Calculations

I calculate historical betas following the methodology used by Value Line. Specifically, I use the following guidelines:

1. Returns for each security are regressed against returns for the overall market in the following form:

   $Ln\ (p^{I}_{t} / p^{I}_{t-1}) = a_{I} + B_{I} * Ln\ (p^{m}_{t} / p^{m}_{t-1})$

   Where:

   - p^{I}_{t} is the price of the security I at time t

- p^{I}_{t-1} is the price of the security I one week before time t
- p^{m}_{t} and p^{m}_{t-1} are the corresponding values of the market index
- B_I is the regression estimate of Beta for the security against the market index

2. The natural log of the price ratio is used as an approximation of each return and no adjustment is made for dividends paid during the week.
3. Weekly returns are calculated weekly on Tuesdays to minimize the effect of holidays as much as possible.
4. Betas calculated using the regression method above are adjusted as per Blume (1971) using the following formula:

   Adjusted $B_I = 0.35 + 0.67 * \text{Calculated } B_I$

The only significant difference between my beta calculations and Value Line's calculations is that, whereas Value Line uses the NYSE Composite Index as the market index, I use the S&P 500 Index. S&P 500 Index has a much larger number of options traded, making the calculation of option-implied betas more reliable, and I wanted to make my historical betas as comparable as possible to my option-implied betas. Value Line only calculates betas every three months and always uses a five year period for the return regression in their company reports[41], whereas I use the same consistent methodology to calculate betas every week during the most recent three complete months (October through December 2019) and calculate historical betas for periods of 6 months, two years, and five years, as shown in Chart 2 above.

[41] The offer betas calculated over different time periods on their website, including 3-years and 10-years.

Option-Implied Beta Calculations

Calculating option-implied betas of a company requires (1) obtaining stock option data for that company and a market index, (2) filtering the stock option data, (3) calculating the option-implied volatility for the company and for the index, (4) calculating the option-implied skewness for the company and for the index, and (5) calculating option-implied betas for the company based on implied volatility and skewness for the company and for the index. There are various ways one could choose to perform the steps above, but I chose to filter stock option data and calculate option-implied volatility[42] and skewness[43] following exactly the same methodology used by the Chicago Board of Options Exchange (CBOE) in the calculation of their widely-used VIX (or Volatility Index) and SKEW Index, respectively.

I start my process with publicly available trading information for all the options for a given security (company or index) for a complete trading day. I then filter the option data as described by the CBOE , using the following guidelines:

1. Use the mid-quote or mark (average of bid and ask) as the option price.
2. Use only out-of-the-money call and put options.
    a. Determine the "moneyness" threshold where absolute difference between call and put prices is smallest (using CBOE "Forward Index Price" formula).

[42] CBOE Volatility Index White Paper, 2018. Cover page says "proprietary information." The author has had access to this document in the public domain for at least 3 years.
[43] The CBOE SKEW Index, 2010. Cover page says "proprietary information." The author has had access to this document in the public domain for at least 3 years.

b. Include "at-the-money" call and put options and use average of call and put prices as price for "blended" option.

3. Exclude all zero bids.

4. Exclude remaining (more out-of-the-money) options when two sequential zero bids are found.

I then apply the series of formulas clearly described in both of the CBOE's white papers to the remaining options to calculate Option-Implied Volatility and Option-Implied Skewness. In the words of the CBOE, each of its two indices is "an amalgam of the information reflected in the prices of all of the selected options." To be clear, Implied Volatility is not exactly the same as the VIX Index and Implied Skewness is not exactly the same as the SKEW Index, but both indices are directly based on their corresponding statistical value.

Option-Implied Volatility reflects investors' expectations regarding future stock price movements. Option-Implied Skewness reflects investors' expectations regarding how implied volatility changes for strike prices that are closer and further to the current value of the underlying stock price.

The CBOE calculates Times to Expiration by the minute—as do I. The Time to Expiration of traded options cannot be changed and varies from day to day. For the sake of consistency, the CBOE calculates the VIX and SKEW indices on a "30-day" basis by interpolating for two sets of options with Times to Expiration closest to the 30-day mark. I prefer to focus on as long of a time horizon as possible for forecasting purposes. Option Times to Expiration vary significantly for various stocks, but can relatively consistently

be found to go out to 6 months (180 days) for utility companies. Therefore, for the sake of consistency, I have chosen to interpolate to calculate 6-month volatility and skewness where possible. Occasionally, Times to Expiration for a given stock do not go out to 180 days. If the greatest Time to Expiration available is 171 days (95%) or greater, I use the volatility and skewness for that group of options as a proxy for the 180-day volatility and skewness, respectively.

Finally, once I have calculated the option-implied volatility and skewness for each company and index using the methodology described above, I calculate option-implied betas using the following formula developed by Christoffersen and Chang (2011):[44]

$$\beta_i = \left(\frac{SKEW_i}{SKEW_m}\right)^{1/3} \left(\frac{VAR_i}{VAR_m}\right)^{1/2}$$

Where:

β_i: $option - implied\ beta\ of\ security\ (e.g. stock, fund)$;
$SKEW_i$: $skewness\ of\ security$;
$SKEW_m$: $skewness\ of\ overall\ market\ (S\&P\ 500)$;
VAR_i: $variance\ of\ company$;
VAR_m: $variance\ of\ overall\ market\ (S\&P\ 500)$.

1c. Equity Risk Premium

My equity risk premium is the expected return on the S&P 500 minus the risk-free rate as described above. I calculated an expected return on the S&P 500 by using stock options traded on this index. The implied volatility for options with an expiration period of one year was approximately 0.1838.[45] This implied volatility indicates that the market

[44] Bo-Young Chang & Peter Christoffersen & Kris Jacobs & Gregory Vainberg. (2011) Option-Implied Measures of Equity Risk, *Review of Finance* 16: 385-428.
[45] Exhibit ALR 5, page 3.

expects the standard deviation of future annual price movements of the S&P 500 to be 18.38%. Based on these market expectations, I considered the following growth rate in the DCF analysis I used to calculate the equity risk premium component of my CAPM:

Base S&P 500 growth of 8.74%

i. The market expects a 68.3% probability of growth equal to or less than this level. The market expects less than a 32% probability of higher growth.

2. Results

Table 6 below shows a summary of my CAPM results:

TABLE 6: CAPITAL ASSET PRICING MODEL (CAPM) - INDICATED COST OF EQUITY

CAPITAL ASSET PRICING MODEL (CAPM) - INDICATED COST OF EQUITY
(Assuming S&P Growth at 68.3% of Option-Implied Normal Distribution)
Water Proxy Group

	3-Month Treasury Bill		30-Year Treasury Bond	
	Hybrid Beta	orward Beta	Hybrid Beta	Forward Beta
Risk Free Ra	1.55%	1.55%	2.39%	2.39%
Beta	0.69	0.89	0.69	0.89
Risk Premiu	9.00%	9.00%	8.16%	8.16%
CAPM	7.76%	9.59%	8.02%	9.68%

Source Exhibit ALR 5, page 1.

VI. ADDITIONAL COMMENTS ON MR. D'ASCENDIS' TESTIMONY

Q. PLEASE SUMMARIZE THE TESTIMONY OF MR. D'ASCENDIS.

A. Mr. D'Ascendis has recommended that the Company be allowed a return on equity of within a range of 10.20% and 10.70% and an overall cost of capital within a range of 7.94%

to 8.19%.[46] He arrived at his recommendation based upon his own versions of the Discounted Cash Flow ("DCF") Model, Risk Premium approach ("RPM") and Capital Asset Pricing Model ("CAPM"). Mr. D'Ascendis testified that, "the use of multiple generally accepted common equity cost rate models…adds reliability and accuracy when arriving at a recommended common equity cost rate."[47] Mr. D'Ascendis applies his three cost of equity methods to a group of 6 water utility companies, 5 of which are in my Water Proxy Group. Mr. D'Ascendis refers to this group as the Utility Proxy Group.[48] He also applies his cost of equity models to a group of non-price regulated companies ("Non-Price Regulated Proxy Group").[49] His cost of equity recommendation (10.20%-10.70%) includes an upward adjustment of 0.50% to account for his claim that BGWC has greater business risk than the companies in his Utility Proxy Group.[50]

Mr. D'Ascendis concluded that current regulatory environment in South Carolina BGWC's smaller size, in relation to his Utility Proxy Group, is the cause of the greater business risk that justifies his 0.50% upward adjustment to his cost of equity recommendation.[51]

Below are the results of Mr. D'Ascendis' three cost of equity methods.

[46] D'Ascendis Direct Testimony, page 2, lines 6-13.
[47] Ibid. page 5, lines 13-17.
[48] Ibid. page 3, lines 7-11.
[49] Ibid, page 3, lines 11-13.
[50] Ibid. page 4, lines 17-22.
[51] Ibid. page 36, lines 3-8.

TABLE 7: D'ASCENDIS COST OF EQUITY RESUTLS		
METHOD	UTILITY PROXY GROUP	NON-PRICE REGULATED PROXY GROUP
DCF	9.03%	12.14%
RPM	10.39%	11.60%
CAPM	9.91%	10.84%

Q. WHAT IS YOUR OVERALL REACTION TO MR. D'ASCENDIS' TESTIMONY?

A. Mr. D'Ascendis' final recommended range of range of common equity cost rates of 10.20%-10.70%[52] overstates the cost of equity. The primary reasons Mr. D'Ascendis and I recommend a different cost of equity for BGWC is because he includes a group of 14 "non-price regulated" companies in his analysis. I do not. He claims these 14 companies are comparable in total risk to water utilities. As discussed below, I determined these 14 companies are riskier than water utilities companies. Therefore, the authorized Return on Equity (ROE) should not be based on the cost of equity of these companies.

Mr. D'Ascendis' cost of equity recommendation would be 9.8%-10.3%[53], if based on his proxy group of 6 water companies (Utility Proxy Group) exclusively.

Non-Price Regulated Proxy Group

Q. SHOULD THE COST OF EQUITY FOR BGWC BE BASED UPON MR. D'ASCENDIS' "NON-PRICE REGULATED PROXY GROUP"?

[52] Ibid, page 4, Table 2.
[53] D'Ascendis Direct Testimony, page 4, Table 2. 9.8% = average of 9.03%, 10.39% and 9.91%. 10.3% = 9.8% + 0.5% "Business Risk Adjustment".

A. No. Mr. D'Ascendis' Non-Price Regulated Proxy Group of 14 companies should not be used because the companies in this group are not comparable in risk to BGWC. As a regulated utility, BGWC has accepted an obligation to serve within its certificated service territory in exchange for the opportunity to recover its costs and earn a return on its investments. Non-price regulated companies have a different business model and are exposed to different risks. Non-price regulated companies face the risk that their customers will no longer purchase their product if they raise prices to cover increasing costs. BGWC, on the other hand, can file for a rate increase to address increasing costs.

The companies in Mr. D'Ascendis' Non-Price Regulated Proxy Group are exposed to tariff related expenses, emerging market economies (e.g. Mexico, Brazil), risks related to recent acquisitions, among many other risks that BGWC is not exposed to. For example, one of his non-price regulated companies, AutoZone, explains in their annual report that their business may be materially adversely affected by the following: (1) political unrest in other countries, (2) the number of older vehicles in service, (3) rising energy prices, (4) the economy, (5) weather, (6) advances in automotive technology, and (7) the number of miles people drive their cars annually, (8) among other risks. Regulated water utilities, including BGWC, are not impacted by many of these factors at all, or to a significantly lower degree because BFWC does not have international operations and if their earnings decline they are impacted for a limited period of time because they can apply for a rate increase. None of the companies in Mr. D'Ascendis' Non-Price Regulated Proxy Group can file for a rate case if political unrest in Brazil, for example, harms earnings.

Q: DO YOU AGREE WITH MR. D'ASCENDIS' METHODOLOGY FOR SELECTING A PROXY GROUP COMPARABLE IN TOTAL RISK TO THE UTILITY PROXY GROUP?

A. No. I found several problems with Mr. D'Ascendis' approach, which I believe results in a proxy group with a significantly different level of total risk than that of the Utility Proxy Group. The most significant problems I see with Mr. D'Ascendis' selection methodology are the following:

1. Despite my best efforts including speaking directly with Value Line, I was unable to reproduce Mr. D'Ascendis' calculations of the "Residual Standard Error of the Regression" and the "Standard Deviation of Beta" for each reported company in his Schedule DWD-6, Pages 2 and 3. If this data was not obtained directly from Value Line, as implied by the cited sources in his schedule, Mr. D'Ascendis should provide more details on the methodology of his calculations.

2. Independently from the definition and the calculations involved, the third criterium (p. 33, lines 5 and 6) establishes a range of "comparable betas" that is far too wide. As Schedule DWD-6, Page 2 makes clear, the "Beta Range" used by Mr. D'Ascendis is between 0.26 and 0.70. It would be impossible to argue that two companies with betas at opposite ends of this range have comparable risk profiles. A company with a beta of 0.70 is theoretically 30% less volatile than the market as a whole, while a company with a beta of 0.26 is theoretically 74% less volatile. Furthermore, the range

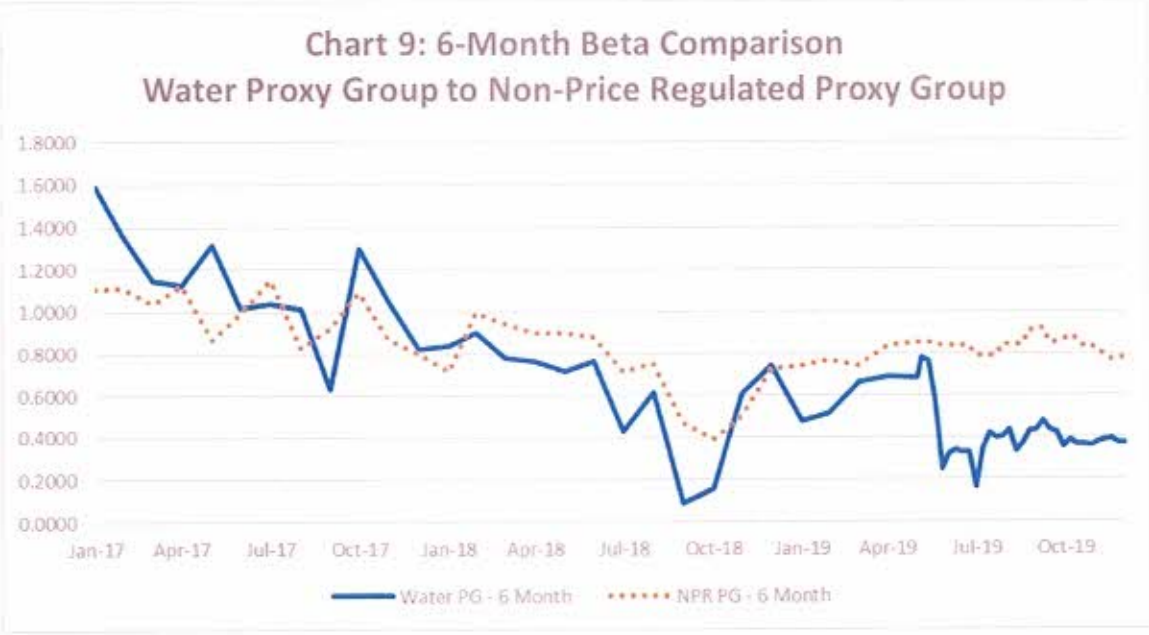
is so wide that there are 263 companies that fit the first three criteria laid out by Mr. D'Ascendis.

3. It is not clear exactly how Mr. D'Ascendis reduces the number of companies from 263 to 14, but what is clear is that 12 out of the 14 companies in the final selection have betas (both adjusted and unadjusted) above the average beta for the Utility Proxy Group. The two that have betas below the average have betas very close to the average. The result is that the average beta for the Non-Price Regulated Companies is 0.12 higher than the average beta for the Utility Proxy Group, implying a significant difference in the risk profile of the two groups. An impartial methodology applied on such a large sample group should result in a comparable group with an average beta closer to the average of the Utility Proxy Group.

Q. MR. D'ASCENDIS STATES THAT COMPANIES THAT HAVE SIMILAR BETA COEFFICIENTS HAVE SIMILAR TOTAL INVESTMENT RISKS. DO THE COMPANIES IN MR. D'ASCENDIS' NON-PRICE REGULATED PROXY GROUP HAVE SIMILAR BETA COEFFICIENTS TO THE WATER UTILITIES IN HIS UTILITY PROXY GROUP?

A. No. While similar beta coefficients do indeed indicate similar total investment risks, as shown in Chart 9 below, the historical betas of the companies in Mr. D'Ascendis' Non-Price Regulated Proxy Group are over twice that of the water companies in his Utility Proxy Group. Since the end of June 2019, the betas for the water utilities average about 0.4 when calculated based on 6-month return data (i.e., considering returns since January

2019 for the June 2019 beta calculations). Over the same time period, the betas for the companies in Mr. D'Ascendis' Non-Price Regulated Proxy Group average over 0.8.



Beta coefficients calculated based on returns over relatively short time periods (e.g., 6 months) can be more indicative of the current risk of companies because it measures recent market activity. If companies have become more or less risky than they were many years ago, betas calculated over shorter time periods will be a better gauge of current risk since they are based only on recent data. That said, betas calculated based on returns over longer periods of time are also worth considering in case recent market developments are temporary. To that end, I compared the beta coefficients of Mr. D'Ascendis' Non-Price Regulated Proxy Group to the water utilities group based on returns over longer periods of time to determine if they indicate a more sustainable relationship. As shown in Chart 10 below, the beta coefficients calculated based on 2-year returns has been about 30% higher for the Non-Price Regulated Proxy Group since the beginning of 2019.